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The evaluation of colon polyps and factors affecting malignancy of polyps

Colon polyps and malignancy

Rıfat Peksöz[1], Serkan Borazan[2], Esra Dişçi[3], Enes Ağırman[3]
[1]Department of General Surgery, Muş State Hospital, Muş
[2]Department of Gastroenterology, Muş State Hospital, Muş
[3]Department of General Surgery, Atatürk University Faculty of Medicine, Erzurum, Turkey

Abstract
Aim: The aim of the study is to examine the demographic and histopathological characteristics of colorectal polyps and to discuss the risk factors for polyps to become malignant.
Material and Methods: A total of 3285 patients who underwent colonoscopy between 2016-2020 were examined. The age and gender of patients, the histopathological type, size, and the number of the polyps, and the region where the polyp was located in the colon were recorded.
Results: Three hundred ninety-five patients were included, and 547 polyps were examined; 67% of the patients were male, 33% were female, and the mean age was 55.4 years. Adenomatous polyps accounted for 62.5% of all polyps, 30.71% were hyperplastic polyps, 6.8% were other polyps. Polyps were located with a rate of 33.45% in rectum, 26.87% in sigmoid colon, 6.2% in ascending colon, 15.9% in transverse colon, 13.71% in descending colon, and 3.83% in cecum. Patients were divided into 2 groups: Group 1: low- risk group 85.8% and Group 2: high -risk group 14.2%. The number of males was higher in both groups. The mean of polyps and polyp diameters were higher in Group 2, and a significant difference was detected between the groups ($p < 0.001$).
Discussion: Colon polyps are more common in men, especially after the age of 50. The patient's age, and the polyp's number, size, and histopathological type are effective factors in the malignancy's development. The majority of polyps are located in the rectosigmoid region, and sigmoidoscopy alone can detect the majority of colorectal polyps and contribute to the diagnosis and treatment of polyps.

Keywords
Colonic polyps; Histopathology; Localization; Size; Malignancy

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Corresponding Author: Rıfat Peksöz, Department of General Surgery, Muş State Hospital, 49100, Muş, Turkey.
E-mail: rifat-peksoz@hotmail.com P: +90 5349214382
Corresponding Author ORCID ID: https://orcid.org/0000-0003-4658-5254

Introduction

Gastrointestinal system polyps are lesions that can be proliferative and neoplastic, which protrude into the stomach and gut lumen and originate from the lumen and submucosal epithelium. Polyps are encountered more frequently in the colorectal region [1]. Although colon polyps are generally asymptomatic, they can cause rectal bleeding, tenesmus, and even intestinal obstruction should they reach very large sizes. The most important feature of polyps is that those with malignancy potential can turn into colorectal cancer [2,3]. Various features such as the size of the polyp, number of adenomas, histological type, and degree of dysplasia are the indicators that demonstrate the malignancy potential [4,5]. Polyps encountered during the colonoscopy need to be removed due to their potential cancer risk. Performing polypectomy and monitoring patients according to the histopathological type decrease the incidence and mortality of colorectal cancers [6-7]. For advanced adenomatous polyps, colonoscopy should be performed within the next 3 years, and for low- risk adenomas, colonoscopy should be performed once every 5 years until a negative colonoscopy examination [8].

In this study, it was aimed to examine the demographic and histopathological features of colorectal polyps and to discuss the risk factors affecting the polyps to become malignant in the light of the literature.

Material and Methods

For this study, ethics committee approval was obtained from the Erzurum Hospital Ethics Committee with the decision number 2020/06-67. A total of 3285 patients who underwent lower gastrointestinal system endoscopy in the endoscopy unit of Muş state hospital between the dates of March 2016–March 2020 were retrospectively examined.

The consent form was obtained from the patients before the colonoscopic procedure. The patients were monitored after their 8 hours of fasting, and the colonoscopy procedure was carried out via the device of Fujinon EC-530WL3 with oxygen support. Only about half of the procedures were carried out under sedation due to the inadequacy of technical installation and equipment.

Lesions that were in the appearance of a polypoid structure but, were reported as a result of histopathology (normal mucosa, solitary rectal ulcer, increase of lymphoplasmacytic cells), patients who had 10 or more reported lesions and were referred to the advanced center without the polypectomy procedure, patients whose biopsy was taken for diagnostic reasons but were not reported as a polyp, and patients whose data could not be obtained were excluded from the research. The age and gender of the patients included in the study, the histopathological type, size, and the number of the polypoid lesions, and the region where the polyp was located in the colon were recorded. In patients who were found to have multiple polyps, the average size of polyps with the same histopathologic types was calculated.

Polypoid lesions were grouped as neoplastic mucosal polyps, non-neoplastic mucosal polyps, and submucosal lesions [7,9] (Table 1). In our study, patients were divided into two groups as low- risk group (Group 1) and high- risk group (Group 2), according to the risk classification in the literature {10]. Polyps whose size of adenoma was equal to or more than 1 cm, polyps whose number of adenomas was equal to or more than 3, polyps with villous components, high-grade dysplasia, or patients whose polyps had the feature of invasive cancer were considered as a high- risk group [9,10].

Statistical analysis

The software package SPSS 21.00 was utilized for statistical analysis. Results were presented as numbers for categorical variables, and as mean ± standard deviation for continuous percentage variables. For the comparison of the means of the groups, Student's t-test was utilized for the variables that demonstrated a normal distribution, and the Mann-Whitney U test was used for the variables that did not demonstrate normal distribution, and a p- value <0.05 was considered significant, while $p<0.001$ was considered extremely significant.

Results

Biopsies were taken from 995 (30.3%) of 3285 patients who underwent colonoscopic procedures in the endoscopy unit. Four hundred fifty-eight (13.94%) of the patients had lesions in a polypoid structure. In accordance with the purpose of the study 63 patients in total were excluded from the study (25 patients were reported as a solitary rectal ulcer or lymphoplasmacytic cell, 25 patients with normal mucosa, 5 patients who had more than 10 polyps but have not undergone polypectomy, 3 patients were under the age of 18, and 5 patients whose data could not be obtained). The study included 395 patients and 547 polyps were examined.

Two hundred sixty-six of the patients (67.3%) were males and 129 (32.6%) of them were females, and the mean age was 55.4 ± 13.2 (20-89) years. The rate of patients who were over the age of 50 was 64.3%.

When examining the number of polyps, it was calculated that there are 168 (30.7%) hyperplastic polyps, 342 (62.5%) adenomatous polyps, 15 (2.7%) serrated polyps, 14 (2.55%) inflammatory polyps, and 8 (1.46%) polyps under the name of other polyps group, which constitutes a total of 547 polyps.

When the colon localization, where the polyps are placed, was investigated, 183 (33.45%) of them were found in the rectum, 147 (26.87%) were found in the sigmoid colon, 34 (6.21%) were found in the ascending colon, 87 (15,9%) were found in the transverse colon, 75 (13,71%) were found in the descending colon, and 21 (3.83%) were found in the cecum (Table 2).

Table 1. Classification of Colorectal Polyps

Mucosal Neoplastic Lesions	Mucosal Non-Neoplastic Lesions	Submucosal Lesions
1.Benign (adenoma)	-Hyperplastic polyp	-Colitis cystica profunda
-Serrated adenoma	- (Normal epithelium)	-Pneumatosis systeiodes intestinalis
-Tubular adenoma	-Juvenile polyp	-Lymphoid polyp
-Tubulovillous adenoma	-Peutz-Jeghers polyp	-Lipoma
-Villous adenoma	-Inflammatory polyp	-Carcinoid
2. Malign (carcinoma)		-Metastatic neoplasms
-Non-invasive		-Other lesions
Carcinoma in situ		
-Invasive		

Table 2. Histopathological types of colon polyps and their localization distribution in the colon

	Rectum Patient/polyp	Sigmoid colon Patient/polyp	Ascending colon Patient/polyp	Transverse colon Patient/polyp	Descending colon Patient/polyp	Caecum Patient/polyp	Total (%)
Adenomatous polyp (Unclassified)	13/15	17/21	3/3	9/10	7/9	4/6	53/64 (%11,7)
Tubular adenoma	56/57	62/63	20/21	46/53	48/49	8/8	240/251 (%45,88)
Tubulovillous adenoma	9/10	6/7	1/1	3/4	1/1	1/1	21/24 (%4,38)
Villous adenoma	2/2	1/1					3/3 (%0,548)
Hyperplastic polyp	72/86	36/36	8/8	18/18	15/15	3/5	152/168 (%30,71)
Inflammatory polyp	7/7	4/4		2/2		1/1	14/14 (%2,559)
Serrated adenoma	4/4	8/9	1/1		1/1		14/15 (%2,74)
Others	2/2	5/6					7/8 (%1,46)
Total (%)	165/183 (%33,45)	139/147 (%26,87)	33/34 (%6,21)	78/87 (%15,9)	72/75 (%13,71)	17/21 (%3,83)	504/547 (%100)

Table 3. Comparison of high risk and low-risk group patients

	Low-Risk (Group 1)	High-Risk (Group 2)	P- Value
n (%)	339 (85,8%)	56 (14,2%)	
Male/Female	230/109=2,1	36/20 =1,8	> 0.05
Mean age/Year	54,4±12,9	61,2±13,6	<0.001
Polyp number	1,28±0.5	2±1.3	<0.001
Polyp diameter/mm	3,6±0.9	5,9±3.7	<0.001

A single polyp in 283 patients (71.6%) and multiple polyps in 112 patients (28.4%) were detected. The mean number of polyps was 1.38 (1-6). 98.5% of the polyps were less than 1 cm in length and 78.7% of them were less than 5 mm. The average diameter of all polyps was 3.92 mm (2-25 mm).

The patients were divided into two groups according to the neoplasia risk group: Group 1: low-risk group including 339 patients (85.8%) and Group 2: high-risk group including 56 patients (14.2%). The mean age of the patients in Group 1 was 54.4±12.9 years, and the mean age of the patients in Group 2 was 61.2±13.6, and a statistically significant difference between the two groups was detected (p <0.001). Two hundred thirty of the patients (67.8%) in Group 1 were males and 109 of them (32.2%) were females, whereas 36 of the patients (64.3%) in Group 2 were males and 20 of them (35.7%) were females, and the number of males in both groups is clearly higher. However, no significant difference was detected between the groups in terms of gender difference (p> 0.05). The mean number of polyps was 1.28±0.5 in Group 1 and 2±1.3 in Group 2, and a significant difference was detected between the two groups (p <0.001). The polyp diameter was 3.6±0.9 mm in Group 1 and 5.9±3.7 mm in Group 2, and a significant difference was detected between the two groups (p <0.001). (Table 3).

Discussion

Colon polyps are among the lesions that are mostly asymptomatic and detected incidentally during the endoscopy. The rate of detecting polyps in colonoscopic procedures was found to be in the range of 10.4-14.4% [7,9,11]. In addition to the male gender, constituting the majority of the patients, the number of patients over the age of 50 is seen in the rate of 76.5-78.1% [9,11,12]. In the literature, the mean age of the patients has been reported to be 59-59.8 years [9,11,12,13]. The rate of polyp detection in patients that we performed endoscopy is 13.9%. Males were constituting a great majority, 67% of the patients and the mean age was 55.4 years. The rate of patients over the age of 50 was 64.3%. Although the rate of the patients over the age of 50 was relatively less than the literature findings, other findings show similarity with the literature.

In the studies conducted in our country, it has been demonstrated that most of the colon polyps were placed in the left colon. Colorectal polyps were detected with a rate of 23.4-37.7% in the rectum, 10.3-26.8% in the sigmoid colon, 13.3-20.3% in the descending colon, 15.3-16.9% in the transverse colon, 3.7-13.2% in the ascending colon, and 2.5-6.2% in the cecum [7,14]. In our study, when examining polyps' distribution in the colon, they are observed with a rate of 33.4% in the rectum, 26.8% in the sigmoid colon, 13.7% in the descending colon, 15.9% in the transverse colon, 6.2% in the ascending colon, and 3.8% in the cecum. The polyps' distribution in the colon in our study shows parallelism with the literature.

Colon polyps are divided into 2 main groups as non-neoplastic polyps and neoplastic polyps [1,7]. Hyperplastic polyps are the most commonly encountered non-neoplastic polyps and are generally assumed not to turn into cancer. However, hyperplastic polyps and neoplastic polyps might get located in the same colon, and since the histopathological type of polyps is indistinguishable macroscopically, polypectomy or biopsy from the lesion is required [15,16].

Hyperplastic polyps are usually located in the rectum and sigmoid colon, and most are less than 5 mm in diameter [17]. In our study, 30.7% of polyps were hyperplastic polyps, and the mean of the polyps' diameters was 3.7 mm; 72.6% of them were located in the rectum and sigmoid region.

Serrated polyps are endoscopically and pathologically unheeded, and their characteristics are still being argued. According to the 2010 WHO classification, serrated polyps are grouped

into three as hyperplastic polyps, sessile serrated adenoma, and traditional serrated adenoma [18]. The rate of serrated adenoma was 2.7% in our study, 86.6% of which were located in the left colon. The mean age of the patients was 56.2 years, and 21.4% of the polyps were in the high-risk patient group. It is not yet known in which risk group serrated polyps will be deemed. Thus, it would be more accurate to consider serrated polyps as neoplastic polyps.

Inflammatory polyps are also non-neoplastic polyps. These are polyps that develop in response to chronic inflammation and occur in conditions such as inflammatory bowel diseases. Most polyps are found in the rectum, and their diameters range between 1-3 cm [7]. The incidence of inflammatory polyps in our study was 2.6%, and 78.6% of polyps were located in the rectosigmoid region. The mean of the inflammatory polyps' diameters was 4 mm, which is lower than the literature data.

Most colorectal polyps are adenomatous polyps that have neoplastic characteristics [19]. Adenomatous polyps are named tubular, tubulovillous, or villous adenoma, depending on the presence and volume of villous tissue [20]. In the conducted studies, adenomatous polyps constitute 81.7-82.5% of all polyps. Among these polyps, tubular adenoma has a portion of 86.8-90.6%, tubulovillous has a portion of 7.7-8.1%, and villous adenoma has a portion of 1.3-3.5% [7,10]. In our study, while adenomatous polyps constituted the 62.5% of all polyps, tubular adenoma constituted the 90.3%, tubulovillous adenoma constituted the 8.6%, and villous adenoma constituted a portion of 1.1%. These findings coincide with the rates in the literature.

Polyps are considered as low and high-risk groups according to the cancer risk. The risk of colorectal cancer increases with the presence of villous/tubulovillous polyps (especially in large numbers) and the presence of adenomatous polyps larger than 1 cm. Adenomas that contain a high degree of dysplasia and/or invasive cancer and that are 1 cm or larger and polyps with villous histology are named advanced adenoma [21]. As age advances, the incidence of encountering polyps in adenomas, the polyp size, and the growth rate of dysplasia increase. While low-grade dysplasia is higher in young patients, the rate of high-grade dysplasia increases with the advancement of age [22]. In the study by Solakoğlu et al., 37.6% of the polyps were considered in the high-risk group. The mean age of high-risk patients was significantly higher and no significant difference was detected between the genders [9]. The ratio of the patients in the higher risk group was 14.2%. The low rate is due to the fact that half of the endoscopic procedures could not be performed under sedation in our hospital, which is a secondary hospital, and the referral of polypoid lesions that were considered as complicated to advanced centers due to technical inadequacies. No significant difference was found between the groups in terms of gender, albeit the majority of the patients in the low and high-risk groups were males. The mean age of patients in the low-risk group was 54.4 years, the mean age of the patients in the high-risk group was 61.2 years, and a significant difference was detected between the two groups.

Although there is a limited number of studies in the literature, the number and size of polyps are important and known factors in terms of malignancy development [5,8,23]. In our study, along with the literature, the mean number and diameter of polyps were found to be significantly greater in the high-risk group.

When studying the literature, it was observed that the number of studies examining the localization area of polyps in the high- risk group was very limited. Neoplastic colorectal polyps are also mostly encountered in the rectosigmoid region, like the other polyps [24]. In our study, no significant difference was detected between the risk ratio of polyps and the colon segment where they were encountered. Correspondingly to the literature, the majority, 51% of high-risk polyps were detected in the rectosigmoid region. However, an important portion of high-risk polyps (24.1%) was found to be in the transverse colon region. This number is above the literature data.

Conclusion

Colorectal polyps are more common in males. While the majority of polyps occur in people over the age of 50, polyps are seen relatively more often between the decades of 4-5. The majority of polyps are encountered in the rectosigmoid region. Even the sigmoidoscopy procedure alone can detect the majority of colorectal polyps and contribute to the diagnosis and treatment of polyps. The age of the patient, the size, number, and the histopathological type of the polyp are the factors that influence the development of malignancy. There are few studies in the literature that discuss risk factors by classifying patients according to their cancer risk groups. There is a need for studies that would be conducted with a wide range of patients, especially in tertiary hospitals where technical equipment and equipment are adequate.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

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